



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,190	06/30/2003	Bruce B. Doris	FIS920030152	1189
32074	7590	06/16/2005	EXAMINER	
INTERNATIONAL BUSINESS MACHINES CORPORATION DEPT. 18G BLDG. 300-482 2070 ROUTE 52 HOPEWELL JUNCTION, NY 12533			TRAN, MAI HUONG C	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/604,190	Applicant(s) DORIS ET AL.	
	Examiner Mai-Huong Tran	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 3/28/05.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-17, 21 and 22 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/28/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-17, and 21-22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,806,584. Although the conflicting claims are not identical, they are not patentably

distinct from each other because the subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: Semiconductor Device Structure Including Multiple FETs Having Different Spacer Widths.

### **Claim Rejections - 35 U.S.C. § 103**

Claim 1-17 and 21-22 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 6,806,584 to Fung et al. in view of Chidambarrao et al. (6,825,529).

The applied references have a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention “by another”; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the

reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Regarding to claim 1, Fung discloses a semiconductor device structure, comprising at least first and second field effect transistors 100, 110 disposed on a substrate 10; the first field effect transistor 100 including a first spacer 120 having a first width W1; the second field effect transistor 110 including a second spacer 130 having a second width W2 (col. 2, lines 55-60 , fig. 1).

Fung does not disclose the second spacer includes a first compressive stress material, and the structure further comprises a tensile stress material disposed on the at least first and second field effect transistors. Chidambarrao teaches the spacer includes a first compressive stress material, and the structure further comprises a tensile stress material disposed on the at least first and second field effect transistors (col. 2, lines 27-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the spacer that includes a first compressive stress material,

and the structure further comprises a tensile stress material disposed on the at least first and second field effect transistors, as taught by Chidambarao in order to provide device performance improvement (col. 2, lines 54-55).

Regarding to claim 2, Fung discloses the structure wherein the first field effect transistor is an nFET and the second field effect transistor is a pFET (col. 2, lines 63-66, fig. 2).

Regarding to claim 3, Fung discloses the structure wherein the first width is less than the second width (col. 2, lines 59-60).

Regarding to claim 4, Fung discloses the structure wherein the structure is an inverter (fig. 3a).

Regarding to claim 5, Fung discloses the structure wherein the structure includes a width transition region located approximately in a middle region between the transistors (fig. 1).

Regarding to claim 6, Fung discloses the structure wherein the first spacer includes an I-shaped part and the second spacer includes an L-shaped part (fig. 13).

Regarding to claim 7, Fung in view of Chidambarrao discloses the structure wherein the second spacer includes an L-shaped part and the first compressive stress material (Fung: fig. 13, Chidambarrai: col. 2, lines 27-30).

Regarding to claim 8, Chidambarrai discloses the structure, wherein the first spacer includes the first compressive stress material (col. 2, lines 27-30).

Regarding to claim 9, Fung discloses the structure wherein the first width is a substantially uniform width in a range of about 10 nm to about 30 nm, and the second width has a maximum width in a range of about 50 nm to about 120 nm (col. 4, lines 39-43).

Regarding to claim 10, Fung in view of Chidambarrai discloses the claimed invention except for the structure wherein the first compressive stress material has a substantially uniform stress in a range of about  $-3E9 \text{ dynes/cm}^2$  to about  $-3E11 \text{ dynes/cm}^2$ .

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the structure wherein the first compressive stress material has a substantially uniform stress in a range of about  $-3E9 \text{ dynes/cm}^2$  to about  $-3E11 \text{ dynes/cm}^2$ , since it has been held that where the general conditions of a

claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding to claim 11, Fung in view of Chidambarao discloses the claimed invention except for the structure wherein the tensile stress material has a substantially uniform film thickness in a range of about 20 nm to about 100 nm and a substantially uniform stress in a range of approximately  $4E9$  dynes/cm.<sup>2</sup> to approximately  $4E11$  dynes/cm.<sup>2</sup>.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the tensile stress material has a substantially uniform film thickness in a range of about 20 nm to about 100 nm and a substantially uniform stress in a range of approximately  $4E9$  dynes/cm.<sup>2</sup> to approximately  $4E11$  dynes/cm.<sup>2</sup>, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding to claim 12, Fung in view of Chidambarao discloses the claimed invention except for the structure wherein the second spacer includes a second compressive stress material having a stress in a range of approximately  $-2E9$  dynes/cm.<sup>2</sup> to approximately  $2E9$  dynes/cm.<sup>2</sup>.



It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the structure wherein the second spacer includes a second compressive stress material having a stress in a range of approximately  $-2 \times 10^9$  dynes/cm.<sup>2</sup> to approximately  $2 \times 10^9$  dynes/cm.<sup>2</sup>., since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding to claim 13, Fung discloses the structure wherein the first compressive stress material is a dielectric (col. 3, lines 50).

Regarding to claim 14, Chidambarao discloses the structure, wherein the first compressive stress material is silicon nitride (col. 4, lines 65).

Regarding to claim 15, Chidambarao discloses the structure, wherein the tensile stress material is SiN (col. 5, lines 2-3).

Regarding to claim 16, Fung discloses the structure wherein the first width is about 50 nm, and the second width has a maximum width of about 90 nm (col. 4, lines 39-50).

Regarding to claim 17, Fung in view of Chidambarao discloses the claimed invention except for the structure wherein the tensile stress material is a layer having a substantially uniform thickness in a range of about 20 nm to about 100 nm.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the tensile stress material is a layer having a substantially uniform thickness in a range of about 20 nm to about 100 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding to claim 21, Fung discloses the structure wherein the substrate is a silicon substrate (col. 2, line 58).

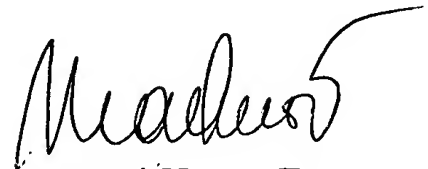
Regarding to claim 22, Fung discloses the structure wherein the substrate comprises GaAs (col. 2, line 61).

### **Conclusion**

Any inquiry concerning this communication on earlier communications from the examiner should be directed to Mai-Huong Tran, (571) 272-1796. The examiner can normally be reached on Monday-Thursday from 8:00 AM to 6:30 PM. The examiner's supervisor, David Nelms can be reached on (571) 272-1787.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to be 'MHT'.A handwritten signature in black ink, appearing to be 'Mai-Huong Tran'.

Mai-Huong Tran